

Description of EPA Air Quality Criteria Pollutants of Concern in Helena

Carbon monoxide - When an area does not meet the air quality standard for one of the criteria pollutants, it may be subject to the formal rule-making process which designates it as nonattainment. The Clean Air Act further classifies ozone, carbon monoxide, and some particulate matter nonattainment areas based on the magnitude of an area's problem. Nonattainment classifications may be used to specify what air pollution reduction measures an area must adopt, and when the area must reach attainment.

Nitrogen oxides, or NO_x, is the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. Many of the nitrogen oxides are colorless and odorless. However, one common pollutant, nitrogen dioxide (NO₂) along with particles in the air can often be seen as a reddish-brown layer over many urban areas. NO_x - is one of the main ingredients involved in the formation of ground-level ozone, which can trigger serious respiratory problems.

NO_x (various nitrous oxides) can have the following effects on the environment and on health:

- Reacts to form nitrate particles, acid aerosols, as well as NO₂, which also cause respiratory problems.
- Contributes to formation of acid rain.
- Contributes to nutrient overload that deteriorates water quality.
- Contributes to atmospheric particles, that cause visibility impairment most noticeable in national parks.
- Reacts to form toxic chemicals.
- Contributes to global warming.

NO_x and the pollutants formed from NO_x can be transported over long distances, following the pattern of prevailing winds in the U.S. This means that problems associated with NO_x are not confined to areas where NO_x are emitted. Therefore, controlling NO_x is often most effective if done from a regional perspective, rather than focusing on sources in one local area.

Ozone is a photochemical oxidant and the major component of smog. While ozone in the upper atmosphere is beneficial to life by shielding the earth from harmful ultraviolet radiation from the sun, high concentrations of ozone at ground level are a major health and environmental concern. Ground-level ozone can be harmful to human health and vegetation, and is created in part by pollution from man-made and natural sources.

Because ground-level ozone accumulates in or near metropolitan areas during certain summer

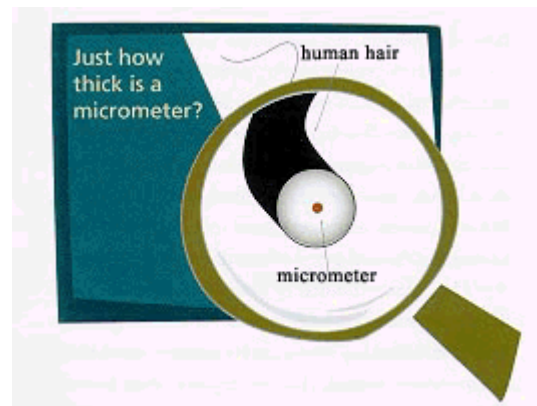
weather conditions, it can expose large numbers of people to unhealthy ozone concentrations. Ozone is a strong irritant to the lungs and airways and can cause chest pain that can be mistaken for heart attack. Ozone may aggravate existing lung diseases and may result in emergency room and hospital admissions. Ground-level ozone forms in the atmosphere as a result of a series of complex chemical reactions between oxides of nitrogen (NO_x) and hydrocarbons. Sources of NO_x and hydrocarbons include motor vehicle exhaust, industrial emissions, gasoline vapors and chemical solvents.

An option to reduce the amount of ozone is to reduce idling time for automobiles – time stop lights, provide public transportation, bike paths, etc.

Sulfur Dioxide (SO₂) – Ambient sulfur dioxide results largely from stationary sources such as coal and oil combustion, steel mills, refineries, pulp and paper mills and from nonferrous smelters. High concentrations of sulfur dioxide affect breathing and may aggravate existing respiratory and cardiovascular disease. Sensitive populations include asthmatics, individuals with bronchitis or emphysema, children and the elderly.

Sulfur dioxide is also a primary contributor to acid deposition, or acid rain, which causes acidification of lakes and streams and can damage trees, crops, historic buildings and statues. In addition, sulfur compounds in the air contribute to visibility impairment in large areas of the country and are especially noticeable in national parks. Sulfur dioxide in Lewis and Clark County was primarily associated with the Asarco lead smelter during its operation. Since the closure of the smelter in 2001, sulfur dioxide emissions dropped from 10,767 pounds in 2001 to 197 pounds in 2002. Monitoring was discontinued after 2002 (EPA Air Data www.epa.gov 6/30/2009). Remaining sources are primarily fuel combustion sources.

Particulate Matter (PM) – Particulate matter in the air is a mixture of solids and liquid droplets that vary in size. Some particles - those less than 10 micrometers in diameter (PM₁₀) - tend to pose the greatest health concern because they can pass through the nose and throat and get deep into the lungs. Ten micrometers in diameter is just a fraction of the diameter of a single human hair. Particles larger than 10 micrometers do not usually reach the lungs, but they can irritate the eyes, nose and throat. (Courtesy Montana Department of Environmental Quality)



Very small particles with diameters less than 2.5 micrometers are called "fine particles" or PM_{2.5}. They are produced any time fuels such as coal, oil, diesel or wood are burned. Fine particles come from fuel used in everything from power plants to wood stoves and motor

vehicles (e.g., cars, trucks, buses and marine engines). These particles are even produced from construction equipment, agricultural burning and forest fires.

"Coarse" dust particles range in size from 2.5 to 10 micrometers in diameter. Particles of this size are produced during crushing or grinding and from vehicles traveling on paved or unpaved roads.

PM_{2.5} is of greater concern because it is small enough to move deep into the lungs, causing increased risk of respiratory disease like bronchitis, asthma attacks, heart attack and stroke. On days when the PM_{2.5} is high, more people are admitted to the hospital for respiratory and cardiovascular problems. World-wide studies have shown a consistent, increased risk for cardiovascular illness in relation to both short-term and long-term exposure to PM 2.5. In recognition of the health risk, EPA tightened the PM_{2.5} standard from 65 micrograms per meter cubed (ug/m³) to 35 ug/m³ in December 2006.

Suggestions to reduce particulate matter include:

- Avoid using gas-powered lawn and garden equipment;
- Reduce number of car trips;
- Avoid burning leaves, trash and other material;
- Reduce or eliminate fireplace and wood stove use; and
- Practice fire-fuel reduction.

Lead (Pb) – Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been motor vehicles (such as cars and trucks) and industrial sources. As a result of EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector dramatically declined by 95 percent between 1980 and 1999, and levels of lead in the air decreased by 94 percent between 1980 and 1999. Today, the highest levels of lead in air are usually found near lead smelters, like the Asarco smelter in East Helena. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers. Since the closure of the smelter in East Helena, lead compound emissions dropped from 18,340 pounds per year in 1999, to 464 in 2002. (EPA Air Data www.epa.gov 6/30/2009)